Note on Dr. Oudemans' Photographs of the Solar Eclipse of December 11–12, 1871. By Lieut-Col. Tennant, R.E.

I am indebted to Dr. A. C. Oudemans of Batavia for copies of two photographs taken by Mr. Dietrichs at Buitenzorg, in Java.

These consist of two paper proofs from the original negatives and two transparent enlargements on glass. In the negatives the diameter of the lunar disk is about 3 m.m., so that the equivalent focus of the lens must have been about 41 c.m., or 16 inches. Dr. Oudemans describes it as No. 10 C by Liesegang, of Elberfeld. The exposure in each case was half a second, and the glass enlargements show that the amount of corona depicted was not very materially less than in the photographs at Dodabetta and Bekul. The Moon's limb is, however, very sharp, and the small negative has borne enlargement to a lunar diameter of 2 c.m., with singularly little loss of definition of the dark edge; which, too, is very free from halation or encroachment from the prominences. In the transparencies sent me, however, there is very much less detail in the corona than in the Indian photographs.

The principal thing to be noted is the very complete resemblance of the general form of the corona in the Java photographs and in our Indian ones, though there was an hour of difference in absolute time. I can recognise almost every depression of outline, and the form and relative sharpness of the edges of the southern rift, and even of the less definite northern one, are very markedly similar. I presume no one now believes the corona to be an atmospheric phenomenon; but these photographs show a considerable amount of permanence in its features, and it would be very interesting to compare the original negatives, for which purpose perhaps those of Mr. Dietrichs could be procured.

I think we learn something, too, as to photography in this application from these photographs.

1st. It is evident that the great altitude of the Sun, and probable clearness of the air at Buitenzorg, allowed an exposure of half a second to impress nearly as much image as the long exposures which we gave in India. I cannot here get the aperture of the lens; but, assuming it to have been a portrait lens of the focal length I have named and of the usual construction, the intensity of the light would have been about four times as great as with the lenses used in India.

Next, it is evident that this more intense light acting only for a short time has not had the tendency to produce halation which the longer exposure produced. This is quite, I think, in accordance with ordinary photographic experience; halation was first conspicuous in dry plates requiring long exposure, and I have prints from my own work in which there are clouds brilliantly illuminated by the Sun setting behind them, and which relieve foliage in the foreground without halation or blurring.

Comparing these photographs with ours at Dodabetta and those taken at Bekul, I am disposed to think that no reasonable

exposure of the plates could have given us so enormous an extension of the corona, as appears to have been obtained by Mr. Brothers at Syracuse in 1870.*

It must now, too, be evident that, as I have all along held, the want of illuminating power in the silver glass reflector was not the cause of the absence of corona from the photographs of 1868. The whole surface of glass in the rectilinear lens does not concentrate light on the point of the image ; but did it do so, we should have as the relative illumination 143·1 for the mirror and 161·6 for the lens. Allowing for a portion of the lens being non-effective, and reflexion at four transmitting surfaces as compared with two reflexions on silver well polished, the instruments used in India in 1868 and 1871 should not be far from equal.

The Buitenzorg pictures show that a fifth of the exposure given at Dodabetta would, with a high sun and clear sky, have produced about equal effects, and the conclusion seems to me absolutely inevitable that the real cause of the absence of corona in 1868 was the haze to which I ascribed it.

I consider this of very great importance, because the large image given by the telescope, as used in 1868, is an enormous gain ; and I am convinced that in photographing the corona in any future eclipse it will be every way desirable to use a reflector, or a lens of similar size, and the former is much cheaper, while the ratio of aperture to focal length can be increased even beyond that of the telescope I had in 1868, which would, I imagine, be difficult in a lens.

I think such photographs should be sought in the next attempt to observe a total eclipse, and care should be taken to have the Sun high.

May 14th, 1873.

Observations of the Partial Solar Eclipse of May 25, made at Forest Lodge, Maresfield. By Capt. Noble.

At the precise instant of first contact the whole sky was covered with clouds ; but, looking through the finder of my equatoreal at $23^h\ 53^m\ 10^s$ L.S.T. = $19^h\ 37^m\ 23^s{\cdot}6$ L.M.T. I caught a glimpse of part of the Sun's limb through a little gap ; and saw that the Moon had then fairly and perceptibly entered on to it.

At $0^h\ 47^m\ 40^s$ L.S.T. = $20^h\ 31^m\ 44^s{\cdot}7$ L.M.T., the eclipse being, as I assume, just past its greatest phase, the ruggedness of the Moon's Southern limb was very noticeable; a sierra or chain of mountains about south, and an isolated one to the west of them, I took to belong to the Dörfel and Leibnitz Mountains.

At $1^h\ 32^m\ 40^s$ L.S.T. = $21^h\ 16^m\ 37^s{\cdot}3$ L.M.T. I could *just* trace the Moon's limb for a very few seconds beyond the Sun's disk ; it was a shade lighter than the sky.

* Mr. Brothers' photograph seems to differ from all those of 1871 in showing nearly all the corona on *one* side.